The 13th International Conference on Bio-inspired Computing: Theories and Applications

(BIC-TA 2018)

November 2 – 4, 2018, Beijing, China

Conference Venue: BUPT Hotel (北邮科技酒店)

No.10 XiTuCheng Rd, Haidian District, Beijing 100876, China

(北京市海淀区西土城路 10 号)

Programme

Registration (Friday, 2nd November 2018)

Date	Event	Location
14:00 - 21:00	Registration and authors' kits (Please approach the registration desk)	the lobby of the hotel
14:00 - 15:00	Tutorial 1 (Chair: Ke Tang) Title: Classification based Selection in Evolutionary Optimization Organisers: **Aimin Zhou**, East China Normal University, China	The 5th conference room (第五会议室)
15:00 - 16:00	Tutorial 2 (Chair: Aimin Zhou) Title: Brain Storm Optimization Algorithms Organisers: **Yuhui Shi**, Southern University of Science and Technology, China; **Shi Cheng**, Shanxi Normal University, China	The 5th conference room (第五会议室)
16:00 - 17:00	Tutorial 3 (Chair: Yuhui Shi, Shi Cheng) Title: Scalable Evolutionary Search – Challenges and Opportunities in the Big Data Era Organisers: **Ke Tang**, Southern University of Science and Technology, China	The 5th conference room (第五会议室)

Technical Programme (Saturday, 3rd November 2018)

Date	Event	Location
08:30 - 09:00	Opening Ceremony Welcome speech given by Conference chairs	Multiple-function hall on the 4th floor (四层多功能厅)
	Opening Ceremony Welcome speech given by Professor **Jianyong Qiao,** President of Beijing University of Posts and Telecommunications	Multiple-function hall on the 4th floor (四层多功能厅)
	Opening Ceremony Welcome speech given by Professor **Yixin Zhong**, Beijing University of Posts and Telecommunications	Multiple-function hall on the 4th floor (四层多功能厅)
09:00 - 09:50	Keynote Speech 1 (Chair：Dunwei Gong) Title: Production, Logistics and Energy Optimization and Application in Steel Industry Professor **Lixin Tang**, Northeastern University, China	Multiple-function hall on the 4th floor (四层多功能厅)
09:50 - 10:40	Keynote Speech 2 (Chair：Aimin Zhou) Title: Tackling Many Objectives Professor **Xin Yao**, Southern University of Science and Technology, China	Multiple-function hall on the 4th floor (四层多功能厅)
10:40 - 11:10	Coffee/Tea Break	
11:10 - 12:00	Keynote Speech 3 (Chair：Zhihui Zhan) Title: Modeling and evolutionary heuristic solutions for some operations planning problems Professor **Jiyin Liu**, Loughborough University, UK	Multiple-function hall on the 4th floor (四层多功能厅)
12:00 - 14:00	Lunch	
14:00 - 15:30	3 Parallel Sessions Series 1	the 4th floor,
15:30 - 16:00	Coffee/Tea Break	the corridor
16:00 - 17:30	3 Parallel Sessions Series 2	
18:00 - 21:00	Conference Banquet	Multiple-function hall on the 4th floor (四层多功能厅)

Technical Programme (Sunday, 4th November 2018)

Date	Event	Location
08:30 - 09:20	Keynote Speech 4 (Chair：Xingyi Zhang) Title: Bayesian Evolutionary Optimization: Recent Advances Professor **Yaochu Jin**, University of Surrey, UK	Multiple-function hall on the 4th floor (四层多功能厅)
09:20 - 10:10	Keynote Speech 5 (Chair：Dongbin Zhao) Title: Generalization and overfitting in deep reinforcement learning Professor **Julian Togelius**, New York University, USA	Multiple-function hall on the 4th floor (四层多功能厅)
10:10 - 10:30	Coffee/Tea Break	
10:30 - 11:20	Keynote Speech 6 (Chair：Ben Niu) Title: Recent Progress on Decomposition Based Multiobjective Evolutionary Computation Professor **Qingfu Zhang**, City University of Hong Kong, China	Multiple-function hall on the 4th floor (四层多功能厅)
11:20 - 12:10	Keynote Speech 7 (Chair：Zhun Fan) Title: Implementing Neuromorphic Reservoir Computing with Self-Assembled Memristive Switching Networks Professor **Thomas H. LaBean**, North Carolina State University, USA	Multiple-function hall on the 4th floor (四层多功能厅)
12:10 - 14:00	Lunch	
14:00 - 15:30	3 Parallel Sessions Series 3	
15:30 - 16:00	Coffee/Tea Break	
16:00 - 17:30	3 Parallel Sessions Series 4	

3rd November 2018: Parallel Sessions Series 1 (14:00 - 15:30)

Rooms	Multiple-function hall on the 4th floor (四层多功能厅)	The 5th conference room (第五会议室)	The 6th conference room (第六会议室)
Section Chair	Khuder Altangerel Jing Yang (Co-Chair)	Dunwei Gong Ming Yang (Co-Chair)	Lining Xing Kang Zhou (Co-Chair)
14:00 - 14:15	*Ganbat Ganbaatar, Khuder Altangerel, and Tseren-Onolt Ishdorj* **Solving NP Hard Problems in The Framework of Gene Assembly in Ciliates**	*Yudong Ni, Yuanyuan Li, and Yindong She*n **An Improved Artificial Bee Colony Algorithm and its Taguchi Analysis**	*Moqin Zhou, Xueli Wang, Xing Zhang, and Wenbo Wang* **Spatial-temporal Analysis of Traffic Load Based on User Activity Characteristics in Mobile Cellular Network**
14:15 - 14:30	*Gaiying Wang, Zhiyu Wang, Xiaoshan Yan, and Xiangrong Liu* **DNA Strand Displacement Based on Nicking Enzyme for DNA Logic Circuits**	*Yuansheng Huang, Hongwei Wang, and Shijian Liu* **Research on "Near-Zero Emission" Technological Innovation Diffusion Based on Co-Evolutionary Game Approach**	*Yuan Wang and Lining Xing* **A Multi Ant System Based Hybrid Heuristic Algorithm for Vehicle Routing Problem with Service Time Customization**
14:30 - 14:45	*Zhenqin Yang, Zhixiang Yin, Jianzhong Cui, and Jing Yang* **DNA Origami Based Computing Model for The Satisfiability Problem**	*Heng Lei, Ming Yang, and Jing Guan* **Differential Grouping in Cooperative Co-Evolution for Large-Scale Global Optimization: the Experimental Study**	*Shiyu Jia, Kang Zhou, Yu Yang, et al* **Application of Artificial Fish Swarm Algorithm in Vehicle Routing Problem**
14:45 - 15:00	*Jingjing Ma and Wenbin Gao* **DNA 3D Self-assembly Algorithmic Model to Solve Maximum Clique Problem**	*Guangzhi Xu, Xinchao Zhao, and Rui Li* **Cooperative Co-evolution with Principal Component Analysis for Large Scale Optimization**	*Lei Liu, Lu Xiao, Lulu Zuo, Jia Liu, and Chen Yang* **Application of BFO Based on Path Interaction in Yard Truck Scheduling and Storage Allocation Problem**
15:00 - 15:15	*Li Li and Keqin Jiang*	*Ning Ding, Li Wang, Wei*	*Yuansheng Huang and Lei*

	Spiking Neural P Systems with Anti-spikes Based on the Min-sequentiality Strategy	*Teng, and Yue Zhao* **Research on Optimization of Warehouse Allocation Problem Based on Improved Genetic Algorithm**	*Shen* **Elman Neural Network Optimized by Firefly Algorithm for Forecasting China's Carbon Dioxide Emissions**
15:15 - 15:30	*Shanshan Xing, Bin Wang, Xiaopeng Wei, et al* **RNA Sequences Similarities Analysis By Cross-Correlation Function**	*Xinchao Zhao, Jiaqi Chen, Rui Li, Dunwei Gong, and Xingmei Li* **An Orthogonal Genetic Algorithm with Multi-parent Multi-point Crossover for Knapsack Problem**	*Yulong Wang and Haoxin Zhang* **Visualize and Compress Single Logo Recognition Neural Network**

3rd November 2018: Parallel Sessions Series 2 (16:00 - 17:30)

Rooms	Multiple-function hall on the 4th floor (四层多功能厅)	The 5th conference room (第五会议室)	The 6th conference room (第六会议室)
Section Chair	Yujun Zheng Jun Suk Kim (Co-Chair)	Zhun Fan Xingquan Zuo (Co-Chair)	Xinye Cai Xuncai Zhang (Co-Chair)
16:00 - 16:15	*Xiaohan Zhou, Zhige Xu, Minxia Zhang, and Yujun Zheng* **Water Wave Optimization for Artificial Neural Network Parameter and Structure Optimization**	*Zhun Fan, Zhaojun Wang, Yi Fang, Wenji Li, Yutong Yuan, and Xinchao Bian* **Adaptive Recombination Operator Selection in Push and Pull Search for solving Constrained Single-objective Optimization Problems**	*Xuncai Zhang, Hangyu Zhou, Zheng Zhou, Lingfei Wang, and Chao Li* **An Image Encryption Algorithm Based on Hyper-Chaotic System and Genetic Algorithm**
16:15 - 16:30	*Yulong Wang and Jiuchao Zhang* **DeepPort: Detect Low Speed Port Scan using Convolutional Neural Network**	*Weiqin Ying, Yali Deng, Yu Wu, Yuehong Xie, Zhenyu Wang, and Zhiyi Lin* **A Cone Decomposition Many-objective Evolutionary Algorithm with Adaptive Direction**	*Tae Jong Choi, Yun-Gyung Cheong, and Chang Wook Ahn* **An Image Encryption Algorithm Based on Hyper-Chaotic System and Genetic Algorithm**

		Penalized Distance	
16:30 - 16:45	*Shibo Zhou and Wenjun Zhang* **Nonlinear Finite-Element Analysis of O shore Platform Impact Load Based on Two-Stage PLS-RBF Neural Network**	*Miao Guo, Bin Xin, Jie Chen, and Yipeng Wang* **An Efficient Restart-Enhanced Genetic Algorithm for the Coalition Formation Problem**	*Mi Hu, Xinye Cai, and Zhun Fan* **A Dual-population-Based Local Search for Solving Multiobjective Traveling Salesman Problem**
16:45 - 17:00	*Gang Peng, Zuhuang Yang, and Min Wang* **Refrigerant Capacity Detection of Dehumidifier Based on Time Series and Neural Networks**	*Yanjie Song, Xin Ma, Zhongshan Zhang, Lining Xing, and Yingwu Chen* **A Hybrid Dynamic Population Genetic Algorithm for Multi-satellite & Multi-station Mission Planning System**	*Xiuli Wu and Jing Li* **Discrete Harmony Search Algorithm for Flexible Job-Shop Scheduling Problems**
17:00 - 17:15	*Yulong Wang, Zhi Wu, and Yifeng Huang* **A Bias Neural Network based on Knowledge Distillation**	*Chong Gao, Bin Wan, Changjun Zhou , Qiang Zhang, Zhixiang Yin, and Xianwen Fang* **Hybrid Invasive Weed Optimization and GA for Multiple Sequence Alignment**	*Juan Li, Yuanxiang Li, and Jie Zou* **Cuckoo Search Algorithm Based on Individual Knowledge Learning**
17:15 - 17:30	*Jun Suk Kim and Chang Wook Ahn* **Motion Deblurring Based On Convolutional Neural Network**	*Hongyi Shi, Chunlu Wang, Xingquan Zuo, and Xinchao Zhao* **A Multiobjective Genetic Algorithm based Dynamic Bus Vehicle Scheduling Approach**	*Chenye Qiu and Xingquan Zuo* **Barebones Particle Swarm Optimization with a Neighborhood Search Strategy for Feature Selection**

4th November 2018: Parallel Sessions Series 3 (14:00 - 15:30)

Rooms	Multiple-function hall on the 4th floor (四层多功能厅)	The 5th conference room (第五会议室)	The 6th conference room (第六会议室)

Section Chair	Ben Niu Shuang Geng (Co-Chair)	Ke Tang Aimin Zhou (Co-Chair)	Yinan Guo Yalan Zhou (Co-Chair)
14:00 - 14:15	*Mingzhu Yu, Xuwen Cong, Ben Niu, and Rong Qu* **Iteration-Related Various Learning Particle Swarm Optimization for Quay Crane Scheduling Problem**	*Rui Ding, Hongbin Dong, Jun He, Xianbin Feng, Xiaodong Yu, and Lijie Li* **U-NSGA-III: An Improved Evolutionary Many-Objective Optimization Algorithm**	*Yuansheng Huang and Hui Liu* **Research on Price Forecasting Method of China's Carbon Trading Market Based on PSO-RBF Algorithm**
14:15 - 14:30	*Rana Muhammad Sohail Jafar, Shuang Geng, Wasim Ahmad, Safdar Hussain, and Hong Wang* **A Comprehensive Evaluation: Water Cycle Algorithm and Its Applications**	*Zheng Li, Xuesong Yan, Yuanyuan Fan, and Ke Tang* **Improved Clonal Selection Algorithm for Solving AVO Elastic Parameter Inversion Problem**	*Gang Peng, Chenyang Zhou, and Siming Wang* **Model Predictive Control of Data Center Temperature Based on CFD**
14:30 - 14:45	*Jinsong Chen, Lu Xiao, Jun Wang, Huan Liu, and Qianying Liu* **A Hybrid Model Based on K-EPF and DPIO for UAVs Target Detection**	*Lin Mei, Shengsheng Wang, and Jie Liu* **A Pests Image Classification Method based on Improved Wolf Pack Algorithm to Optimize Bayesian Network Structure Learning**	*Yuansheng Huang, Lijun Zhang, Mengshu Shi, Shijian Liu, and Siyuan Xu* **Medium and Long-term Forecasting Method of China's Power Load Based on SaDE-SVM Algorithm**
14:45 - 15:00	*Ben Niu, Huan Liu, Lei Liu, and Hong Wang* **A Hybrid Data Clustering Approach Based on Hydrologic Cycle Optimization and K-means**	*Ruozhu Zhang* **A Study of Industrial Structure Optimization under Economy, Employment and Environment Constraints Based on MOEA**	*Yuansheng Huang, Jianjun Hu, Yaqian Cai, and Lei Yang* **Coupling PSO-GPR Based Medium and Long Term Load Forecasting in Beijing**
15:00 - 15:15	*Jun Wang, Jinsong Chen, Qianying Liu, and Jia Liu* **HCO-Based RFID Network Planning**	*Xiaoji Chen, Chuan Shi, Aimin Zhou, Siyong Xu, and Bin Wu* **A Hybrid Replacement**	*Yalan Zhou, Chen Li, and Yanyue Li* **A Simulated Annealing for Multi-modal Team**

		Strategy for MOEA/D	**Orienteering Problem with Time Windows**
15:15 - 15:30	*Mingzhu Yu, Zhichuan Chen, Li Chen, Rong Qu, and Ben Niu* **Modified Mixed-dimension Chaotic Particle Swarm Optimization for Liner Route Planning with Empty Container Repositioning**	*Xing Wan, Xingquan Zuo, and Feng Song* **A Decomposition Based Multiobjective Evolutionary Algorithm for Dynamic Overlapping Community Detection**	*Jian Cheng, Yusen Gang, Shuai Bai, Yinan Guo, and Dongwei Wang* **An Improved GMM-based Moving Object Detection Method under Sudden Illumination Change**

4th November 2018: Parallel Sessions Series 4 (16:00 - 17:30)

Rooms	Multiple-function hall on the 4th floor (四层多功能厅)	The 5th conference room (第五会议室)	The 6th conference room (第六会议室)
Section Chair	Yong Zhang Shi Cheng (Co-Chair)	Ping Guo Jing Yang (Co-Chair)	Dongju Park Huang Weidong (Co-Chair)
16:00 - 16:15	*Shi Cheng, Hui Lu, Wu Song, Junfeng Chen, and Yuhui Shi* **Dynamic Multimodal Optimization Using Brain Storm Optimization Algorithms**	*Wangsheng Fang, Geng Yang, and Zhongdong Hu* **An Improved DV-Hop Algorithm With Jaccard Coefficient Based on Optimization of Distance Correction**	*Dongju Park and Chang Wook Ahn* **LSTM Encoder-Decoder with Adversarial Network for Text Generation from Keyword**
16:15 - 16:30	*Xutao Zhang, Yong Zhang, Hairong Gao, and Chunlin He* **A Wrapper Feature Selection Algorithm Based on Brain Storm Optimization**	*Ping Guo, Changsheng Quan, and Lian Ye* **A Simulator for Cell-like P System**	*Rui Li, Guangzhi Xu, Xinchao Zhao, and Dunwei Gong* **Origin Illusion, Elitist Selection and Contraction Guidance**
16:30 - 16:45	*Xin Chen and Xiangrong Liu* **A Weighted Bagging LightGBM Model for**	*Luhui Wang, Yingying Zhang, Yani Wei, and Yafei Dong* **Multifunctional Biosensor**	*Michele Della Ventura* **Computer System for Designing Musical Expressiveness in an**

	Potential lncRNA-Disease Association Identification	**Logic Gates Based on Grapheneoxide**	**Automatic Music Composition Process**
16:45 - 17:00	*Yulong Wang and Hua Zong* **DroidGene: Detecting Android Malware Using its Malicious Gene**	*Jing Yang, Zhixiang Yin, Jianzhong Cui, Qiang Zhang, and Zhen Tang* **The Chinese Postman Problem Based on the Probe Machine Model**	*Gong Dunwei, Peng Chao, Zhao Xinchao, and Lin Qiuzhen* **A Method of Accurately Accepting Tasks for New Workers Incorporating with Capacities and Competition Intensities**
17:00 - 17:15	*Xueqin Lu, Yichen Du, Xuhua Yang, and Yujun Zheng* A **Biogeography-Based Memetic Algorithm for Job-Shop Scheduling**	*Xuncai Zhang, Zheng Zhou, Ying Niu, Yanfeng Wang, and Lingfei Wang* **An Image Encryption Algorithm Based on Chaotic System Using DNA Sequence Operations**	*Wang Jie, Peng Yan, Ren Xiaoxiao, and Qiao Yixuan* **An Expert System for Diagnosis and Treatment of Hypertension Based on Ontology**
17:15 - 17:30	*Yichen Du, Minxia Zhang, Ciyun Cai, and Yujun Zheng* **Enhanced Biogeography-Based Optimization for Flow-Shop Scheduling**	*Guangzhao Cui, Lingfei Wang, Xuncai Zhang, and Zheng Zhou* **An Image Encryption Algorithm Based on Dynamic DNA Coding and Hyper-Chaotic Lorenz System**	*Huang Weidong and CuiYang* **Research on Public Opinion Communication Mechanism Based on Individual Behavior Model**
		Ping Guo and Junqi Xiang **An Attribute Reduction P System Based on Rough Set Theory**	

Tutorial 1

Title: Classification based Selection in Evolutionary Optimization

Organiser: **Aimin Zhou**, East China Normal University, China

Abstract: In evolutionary algorithms, a selection operator aims to choose some promising offspring solutions out from a candidate solution set. Most existing selection operators are based on fitness values, or surrogate models. Since a selection operation can be regarded as a classification procedure, the classification techniques can be naturally applied to assist the selection in evolutionary algorithms. In the last few years, our team has been working on this direction. This talk provides with a general picture of our recent work on classification based selection in evolutionary optimization. The main content of the talk includes the research background, a basic classification based pre-selection (CPS) operator, the analysis and comparison on the CPS operator, and the extensions of CPS to different kinds of problems and other selection operators. Finally, the talk finishes with a discussion of some research topics that might be promising in the future.

Biography: Dr. Aimin Zhou is currently a Professor with the Department of Computer Science and Technology, East China Normal University, Shanghai, China. He received the B.Sc. and M.Sc. degrees from Wuhan University, Wuhan, China, in 2001 and 2003, respectively, and the Ph.D. degree from University of Essex, Colchester, U.K., in 2009, all in computer science. His research interests include evolutionary computation and optimization, machine learning, image processing, and their applications. He has published over 50 peer-reviewed papers, and received the best paper award in IES 2014. He is an Associate Editor of the Swarm and Evolutionary Computation, the Complex & Intelligent Systems, and the Swarm Intelligence and Numerical Methods.

Tutorial 2

Title: Brain Storm Optimization Algorithms

Organisers: **Yuhui Shi**, Southern University of Science and Technology, China;
Shi Cheng, Shanxi Normal University, China

Abstract: For swarm intelligence algorithms, each individual in the swarm represents a solution in the search space, and it also can be seen as a data sample from the search space. Based on the analyses of these data, more effective algorithms and search strategies could be proposed. Brain storm optimization (BSO) algorithm is a new and promising swarm intelligence algorithm, which simulates the human brainstorming process. Through the convergent operation and divergent operation, individuals in BSO are grouped and diverged in the search space/objective space. In this talk, the development history, and the state-of-the-art of the BSO algorithm are reviewed. Every individual in the BSO algorithm is not only a solution to the problem to be optimized, but also a data

point to reveal the landscape of the problem. Based on the survey of brain storm optimization algorithms, more analyses could be conducted to understand the function of BSO algorithm and more variants of BSO algorithms could be proposed to solve different problems.

Biography: Prof. Yuhui Shi received the PhD degree in electronic engineering from Southeast University, Nanjing, China, in 1992. He is a chair professor in the Department of Computer Science and Engineering, Southern University of Science and Technology, Shenzhen, China. He is a Fellow of the IEEE. His main research interests include the areas of computational intelligence techniques (including swarm intelligence) and their applications. Dr. Shi is the Editor-in-Chief of the International Journal of Swarm Intelligence Research.

Personal webpage: http://cse.sustc.edu.cn/cn/people/view/people_id/3/sort_id/9/pid/

Biography: Dr. Shi Cheng received the Bachelor's degree in Mechanical and Electrical Engineering from Xiamen University, Xiamen, the Master's degree in Software Engineering from Beihang University (BUAA), Beijing, China, the Ph.D. degree in Electrical Engineering and Electronics from University of Liverpool, Liverpool, United Kingdom in 2005, 2008, and 2013, respectively. He is currently a lecturer with School of Computer Science, Shaanxi Normal University, China. His current research interests include swarm intelligence, multiobjective optimization, and data mining techniques and their applications.

Tutorial 3

Title: Scalable Evolutionary Search-Challenges and Opportunities in the Big Data Era

Organiser: **Ke Tang**, Southern University of Science and Technology, China

Abstract: Evolutionary Search has been shown to be a powerful approach to complex search problems (e.g., NP-hard optimization problems). The big data era has brought new challenging problems, the complexity, requirement, and even available facility of which have dramatically changed in the last decade. This talk will demonstrate three typical research challenges/questions that have been brought to a prominent position in the research of evolutionary computation by the big data era, and introduce our latest efforts to tackle these challenges.

Biography: Ke Tang is a Professor at the Department of Computer Science and Engineering, Southern University of Science and Technology (SUSTech). His major research interests include machine learning, evolutionary computation and their applications. He has published more than 130 journal and conference papers. According to Google Scholar, his publications have received more than 6000 citations and the H-index is 35. He is/was an Associate Editor or Editorial Board Member of the IEEE Trans. on Evolutionary

Computation, IEEE Computational Intelligence Magazine, Computational Optimization and Applications (Springer), Natural Computing (Springer) and Memetic Computing (Springer) and served as program/technical chairs/co-chairs of 10 international conferences. He received the Royal Society Newton Advanced Fellowship in 2015 and the 2018 IEEE Computational Intelligence Society Outstanding Early Career Award.

Keynote Speech 1

Title: Production, Logistics and Energy Optimization and Application in Steel Industry

Professor **Lixin Tang**, Northeastern University, China

Abstract: This talk discusses some interesting topics on the scheduling and data analytics of production, logistics and energy in the steel industry, including: 1) production scheduling in steel-making and hot/cold rolling operations; 2) logistics scheduling in storage/stowage, shuffling, transportation and (un)loading operations; 3) energy optimization including energy allocation and coordinated planning and scheduling of production and energy; 4) data based analytics including dynamic analytics of BOF steelmaking process based on multi-stage modeling; temperature prediction of blast furnace; temperature prediction of molten iron in transportation process; energy analytics for estimation, prediction of generation and consumption, diagnosis and benchmarking; temperature prediction of reheat furnace based on mechanism and data; strip quality analytics of continuous annealing based on multi-objective ensemble learning; process monitoring and diagnosis of continuous annealing based on mechanism and data.

Biography: Lixin Tang is a Cheung Kong Scholars Chair Professor, the Vice President of Northeastern University, the Director of the Institute of Industrial & Systems Engineering, and the Head of the Operation Analytics and Optimization Centre for Smart Industry at Northeastern University of China. His research interests cover plant-wide production and logistics planning, production and logistics batching and scheduling, operations analytics and optimization for smart industry, convex and integer optimization, data analytics and machine learning, computational intelligent optimization and engineering applications in manufacturing (steel, petroleum-chemical, nonferrous), energy, resources industry and logistics systems.

He has published 106 papers in international journals such as OR, M&SOM, INFORMS Journal on Computing, IISE Transactions, NRL, IEEE Transactions on Evolutionary Computation. He was selected into the list of 2014, 2015 and 2016 Most Cited Chinese Researchers by Elsevier. The paper published on flagship journal IIE Transactions (now renamed as IISE Transactions) won the Best Applications Paper Award of 2015-2016.

He serves as an Associate Editor of IISE Transactions, IEEE Transactions on Evolutionary Computation, IEEE Transactions on Cybernetics, IEEE Transactions on Automation Science and Engineering, Journal of Scheduling, International Journal of Production Research, Journal of the Operational Research Society, in Editorial Board of Annals of Operations Research, and an Area

Editor of the Asia-Pacific Journal of Operational Research.

Keynote Speech 2

Title: Tackling Many Objectives

Professor Xin Yao, Southern University of Science and Technology, China

Abstract: Many optimisation problems in the real world need to consider multiple conflicting objectives simultaneously. Evolutionary algorithms are excellent candidates for finding a good approximation to the Pareto optimal front in a single run. However, many multi-objective optimisation algorithms are effective for two or three objective only. It is an on-going challenge to deal with a larger number of objectives. In this talk, I will explain several methods for dealing with many objectives. First, we will describe a method for reducing a large number of objectives to a smaller one, especially when there is redundancy among different objectives. Second, alternative dominance relationship, other than the Pareto dominance, will be introduced into to make previously non-comparable solutions comparable. Lastly, new algorithms will be introduced to cope with many objectives through the use of two separate archives, for convergence and diversity, respectively. Our studies show that these methods are very effective and outperform other popular methods in the literature.

Biography: Xin Yao is a Chair Professor of Computer Science at the Southern University of Science and Technology, Shenzhen, China, and a part-time Chair Professor of Computer Science at the University of Birmingham, UK. He is an IEEE Fellow, a former President (2014-15) of IEEE Computational Intelligence Society, and a former Editor-in-Chief (2003-08) of IEEE Transactions on Evolutionary Computation. His major research interests include evolutionary computation, ensemble learning and search-based software engineering. His work won the 2001 IEEE Donald G. Fink Prize Paper Award, 2010, 2016 and 2017 IEEE Transactions on Evolutionary Computation Outstanding Paper Awards, 2010 BT Gordon Radley Award for Best Author of Innovation (Finalist), 2011 IEEE Transactions on Neural Networks Outstanding Paper Award, and many other best paper awards. He received the prestigious Royal Society Wolfson Research Merit Award in 2012 and the IEEE CIS Evolutionary Computation Pioneer Award in 2013.

Keynote Speech 3

Title: Modeling and evolutionary heuristic solutions for some operations planning problems

Professor **Jiyin Liu**, Loughborough University, United Kingdom

Abstract: Metaheuristics are effective tools for solving combinatorial optimization problems.

While the algorithm structures are similar, the representation and evaluation of solutions differ massively for different problem types. This talk focuses on this aspect while introducing our work on modelling and heuristic solutions of some operations planning problems. These include a green vehicle routing problem to demonstrate the need for more precise evaluation of the objective function, and a gate assignment problem to show that feasibility check and solution modification may take most of the solution time.

Biography: Jiyin Liu is a Professor of Operations Management in the School of Business and Economics at Loughborough University. He works in both operations management and operational research areas. Jiyin received his PhD in Manufacturing Engineering and Operations Management from the University of Nottingham in 1993 and lectured at Hong Kong University of Science and Technology before joining Loughborough at the end of 2003. He is also a Chang Jiang Scholar Chair Professor at Northeastern University of China since 2007.

Jiyin's research is mainly on modelling and optimisation of operations planning problems in logistics and production systems. His research outputs have been published in leading academic journals in the areas of operational research and operations management, such as Operations Research, European Journal of Operational Research, Transportation Research Part B, Manufacturing & Service Operations Management, Naval Research Logistics, International Journal of Production Research, IIE Transactions, and IEEE Transactions.

Jiyin focuses on problems with both academic significance and practical relevance. His work has been supported by research funding agencies and by industry. He has collaborated with companies such as Baosteel, British Telecom, Hongkong International Terminals, Hong Kong Air Cargo Terminals Limited, and Philips Electronics. He received the Franz Edelman Finalist Awards from INFORMS for Achievements in Practice of Operations Research and Management Sciences twice for works on decision support in container terminal operations (2004) and in steel industry (2013), respectively.

Keynote Speech 4

Title: Data-driven evolutionary optimization: A taxonomy and case studies

Professor **Yaochu Jin**, University of Surrey, United Kingdom

Abstract: Bayesian optimization has been successful in black-box optimization thanks to the powerful modeling capacity of Gaussian processes and principled model management techniques. However, their success has been limited to low-dimensional systems due to the prohibitive

computational complexity when the number of training samples is large. This talk presents some recent advances in infill criterion driven evolutionary optimization of high-dimensional systems, including the use of heterogeneous ensembles and dropout deep neural networks for replacing the Gaussian process and a multi-objective infill criterion. Empirical results indicate that extended Bayesian principles in combination of evolutionary optimization are promising for solving high-dimensional problems.

Biography: Yaochu Jin received the B.Sc., M.Sc., and Ph.D. degrees from Zhejiang University, Hangzhou, China, in 1988, 1991, and 1996, respectively, and the Dr.-Ing. degree from Ruhr University Bochum, Germany, in 2001.

He is a Professor in Computational Intelligence, Department of Computer Science, University of Surrey, Guildford, U.K., where he heads the Nature Inspired Computing and Engineering Group. He is also a Finland Distinguished Professor funded by the Finnish Agency for Innovation (Tekes) and a Changjiang Distinguished Visiting Professor appointed by the Ministry of Education, China. His main research interests include data-driven surrogate-assisted evolutionary optimization, evolutionary multi-objective optimization, evolutionary learning, interpretable and secure machine learning, and evolutionary developmental systems. He has (co)authored over 250 peer-reviewed journal and conference papers and been granted eight patents on evolutionary optimization. He has delivered 30 invited keynote speeches at international conferences.

Dr Jin is the Editor-in-Chief of the IEEE TRANSACTIONS ON COGNITIVE AND DEVELOPMENTAL SYSTEMS and Co-Editor-in-Chief of Complex & Intelligent Systems. He is an IEEE Distinguished Lecturer (2013-2015 and 2017-2019) and past Vice President for Technical Activities of the IEEE Computational Intelligence Society (2014-2015). He is the recipient of the 2018 IEEE Transactions on Evolutionary Computation Outstanding Paper Award, the 2015 and 2017 IEEE Computational Intelligence Magazine Outstanding Paper Award, and the Best Paper Award of the 2010 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology. He is a Fellow of IEEE.

Keynote Speech 5

Title: Generalization and overfitting in deep reinforcement learning

Professor **Julian Togelius**, New York University, USA

Abstract: Reinforcement learning is the study of methods for learning to act based on interactions with the environment alone. It carries the promise of learning to solve hard problems we do not

currently know how to solve, helping to realize the dream of self-learning AI. The last few years have seen reinforcement learning algorithms combined with deep neural networks learn to play an array of games of varying character and complexity. But we've also seen some of the limitations of these algorithms. They seem to learn brittle policies, that only work for the particular games, and sometimes even only for particular levels of those games. Why is this happening, and what could we do to about it? I will discuss some of the problems with reinforcement learning research, and showcase work from my lab on characterizing and ameliorating the ills of reinforcement learning. This includes methods for teaching networks gradually more general skills, and for training extremely small networks capable of playing complex games. A central insight is that the environment and training regime is at least as important as the learning algorithm.

Biography: Julian Togelius is an Associate Professor in the Department of Computer Science and Engineering, New York University, USA. He works on artificial intelligence for games and games for artificial intelligence. His current main research directions involve search-based procedural content generation in games, general video game playing, player modeling, generating games based on open data, and fair and relevant benchmarking of AI through game-based competitions. He is the Editor-in-Chief of IEEE Transactions on Games, and has been chair or program chair of several of the main conferences on AI and Games. Togelius holds a BA from Lund University, an MSc from the University of Sussex, and a PhD from the University of Essex. He has previously worked at IDSIA in Lugano and at the IT University of Copenhagen.

Keynote Speech 6

Title: Recent Progress on Decomposition Based Multiobjective Evolutionary Computation

Professor **Qingfu Zhang**, City University of Hong Kong, China

Abstract: Over the last ten years, decomposition based multiobjective evolutionary algorithms (MOEA/D) have become a major methodology in the field of evolutionary computation. These algorithms uses decomposition techniques from traditional multiobjective optimization to decompose a multiobjective optimization problem into a set of subtasks and then solve them in a collaborative manner. In this talk, I will explain the basic ideas behind MOEA/D and some recent developments. I will also outline some possible research issues in multiobjective evolutionary computation.

Biography: Prof. Qingfu Zhang is a Professor at the Department of Computer Science, City University of Hong Kong, Hong Kong. His main research interests include evolutionary computation, optimization, neural networks, data analysis,

and their applications. He is currently leading the Metaheuristic Optimization Research Group in City University of Hong Kong.

Dr. Zhang is an Associate Editor of the IEEE Transactions on Evolutionary Computation and the IEEE Transactions on Cybernetics. He is also an Editorial Board Member of three other international journals. He is a 2016, 2017 and 2018 highly cited researcher in Computer Science (Clarivate Analytics) and an IEEE fellow. He was selected in the 1000 talents program. He was a Changjiang visiting chair professor.

Keynote Speech 7

Title: Implementing Neuromorphic Reservoir Computing with Self-Assembled Memristive Switching Networks

Professor **Thomas H. LaBean**, North Carolina State University, USA

Abstract: Training and use of large nonlinear neural networks on conventional computer architectures is impeded by poor scalability and high energy penalties for sequential updates of neuron weights. Here we develop a low power and highly scalable computing paradigm of self-assembled neural network-like architectures using DNA origami, functional peptides, and inorganic components for fabrication of circuits with potential for real-time computing. We experimentally and theoretically examine circuits created by the molecular assembly of functional components capable of displaying complex, emergent electronic behaviors such as memristor based reservoir computing. Deterministic assembly at low nanometer length-scales followed by stochastic assembly at high nanoscale and up to micron scale should provide circuits with exploitable electronic behaviors. Theoretical work focuses particularly on modeling and simulation of device function and network structure/function in order to predict emergent electronic properties. Network architectures will follow neuromorphic principles and will result in trainable or learnable circuits with potential capabilities including memory, logic, and complex signal processing.

Biography: Thomas H. LaBean is Professor of Materials Science and Engineering at North Carolina State University. He earned BS and PhD degrees in Biochemistry from the Honors College at Michigan State University and the University of Pennsylvania, respectively. He studied folding and assembly of arbitrary sequence proteins in graduate school, then moved to Duke University as a Biochemistry postdoc and studied de novo protein design. As a Research Professor in Computer Science, he worked on DNA-based molecular computation and self-assembling biomolecular nanostructures. He has been at North Carolina State University since 2011, and his current research involves self-assembling polypeptides and DNA nanostructures for molecular materials, bioinspired nanoelectronics fabrication, and nanomedicine.